[10191/1714] AF IDW 1753

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:		Examiner: Kaj K. Olsen
	Jens Stefan SCHNEIDER et al.	
For	SENSOR FOR DETERMINING A CONCENTRATION OF GAS COMPONENTS IN GAS MIXTURES	
Filed:	May 9, 2001	Art Unit: 1753
Serial No.:	09/786,903	
Confirmation No.	7920	

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APPEAL BRIEF TRANSMITTAL

SIR:

Accompanying this Appeal Brief Transmittal is an Appeal Brief pursuant to 37 C.F.R. § 1.192(a) **in triplicate** for filing in the above-identified patent application.

Appellants mailed a Notice Of Appeal on June 3, 2004 from the Final Office Action mailed by the U.S. Patent and Trademark Office on February 9, 2004. The Notice was filed on June 7, 2004, so that the two-month appeal brief filing date is August 9, 2004 (since August 7, 2004 falls on a Saturday). In the Final Office Action, claims 10 to 29 were finally rejected.

Please charge the appropriate fee of **$330.00**, which is believed to be the Appeal Brief fee under 37 C.F.R. § 1.17(c), to Deposit Account No. **11-0600**. The Commissioner is also authorized, as necessary and/or appropriate, to charge any additional and appropriate fees, including any Rule 136(a) extension fees, or credit any overpayment to Deposit Account No. **11-0600**. A duplicate copy of this transmittal is enclosed for that purpose.

Respectfully submitted,

Dated: 8/9/2004

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[10191/1714]

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APPEAL BRIEF PURSUANT TO 37 C.F.R. § 1.192(a)

SIR:

In the above-identified patent application ("the present application"), Appellants mailed a Notice Of Appeal on June 3, 2004 from the Final Office Action mailed by the U.S. Patent and Trademark Office on February 9, 2004. The Notice was filed on June 7, 2004, so that the two-month appeal brief filing date is August 9, 2004 (since August 7, 2004 falls on a Saturday). In the Final Office Action, claims 10 to 29 were finally rejected.

A Response After A Final Office Action was mailed on March 11, 2004. An Advisory Action was mailed on April 1, 2004.

In accordance with 37 C.F.R. § 1.192(a), this Appeal Brief is being submitted in triplicate in support of the appeal of the final rejections of claims 10 to 29. It is respectfully submitted that the final rejections of claims 10 to 29 should be reversed for the reasons set forth below.

1. REAL PARTY IN INTEREST

The real party in interest in the present appeal is Robert Bosch GmbH ("Robert Bosch") of Stuttgart in the Federal Republic of Germany. Robert Bosch is the assignee of the entire right, title and interest in the present application.

2. RELATED APPEALS AND INTERFERENCES

There are no interferences or other appeals related to the present application, which "will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal".

3. STATUS OF CLAIMS

1. Claims 10 to 29 stand rejected under 35 U.S.C. § 112, first paragraph, as lacking enablement.

2. Claims 20 to 22, 26 and 28 were rejected under the first paragraph of 35 U.S.C. § 112 as to the written description requirement.

4. STATUS OF AMENDMENTS

In response to the Final Office Action mailed on February 9, 2004, Appellants filed a Response After A Final Office Action ("the Response After Final"), which was mailed on March 11, 2004.

5. SUMMARY OF THE INVENTION

The subject matter of the present application is directed to addressing the following problems and/or providing the following benefits.

The present invention is applicable to any sensor that determines the concentration of gas components in gas mixtures. The exemplary embodiments of the present invention (and the problem on which they are based) are explained with respect to a senor for determining either the oxygen concentration or the concentration of a reducing gas component. (Specification, page 4, lines 14 to 16).

In an exemplary embodiment of the present invention, a sensor to determine a

concentration of gas components in gas mixtures includes an arrangement of just two measuring electrodes, a first measuring electrode (mixed potential electrode) which has little or no catalytic effect on the establishment of an equilibrium in the gas mixture and a second measuring electrode (equilibrium electrode) which catalyzes the establishment of an equilibrium in the gas mixture as well as a solid electrolyte that is conductive for oxygen ions arranged between the two measuring electrodes, with the two measuring electrodes being exposed to the gas mixture. (Specification, page 4, lines 17 to 26).

An exemplary embodiment of the present invention provides that at least the first measuring electrode includes a cermet electrode, where at least one metal oxide component of the cermet electrode is capable of reversible incorporation of oxygen. The potential of this first measuring electrode is kept almost constant in the range around lambda ≈ 1. The first measuring electrode is the reference electrode in this operating state of the internal combustion engine and the second measuring electrode functions as the working electrode. When the operating state of the internal combustion engine changes to a range with lambda > 1, the potential of the second measuring electrode is almost constant, while the potential of the first measuring electrode is variable and is determined by the concentration of the reducing gas components. Hence, the second measuring electrode is the reference electrode and the first measuring electrode is the working electrode. (Specification, page 4, line 27 to page 5, line 7).

According to one aspect of an exemplary embodiment of the present invention, suitable metal oxide components for the first measuring electrode include mixed oxides such as $TiNiNbO_x$ or $FeNiMnO_4$. Also, a noble metal such as gold may be incorporated into the first measuring electrode. The potential of the first measuring electrode may be adapted very accurately to the requirements of a given application. (Specification, page 5, lines 9 to 15).

An exemplary embodiment of the present invention provides that a reference electrode is exposed to a reference gas in conjunction with the two measuring electrodes exposed to the gas mixture. The measuring electrodes may be arranged side by side, i.e., both in the same layer of a multilayer sensor. Also, the two measuring electrodes may be arranged one after the other in different layers, starting from an outer side of the sensor in the direction

of the reference electrode. One layer between the two measuring electrodes must be sufficiently porous in order to allow a sufficiently rapid establishment of an equilibrium in the constantly changing concentrations of the individual exhaust gas components. One measuring electrode corresponds to the mixed potential electrode based on oxygen-storing metal oxide components and the other measuring electrode is configured as an equilibrium electrode. (Specification, page 5, lines 17 to 32).

According to another aspect of the present invention, the mixed potential electrode is arranged closer to the exhaust gas because it has a stable and constant potential in rapid gas changes at lambda values around 1. In addition to an equilibrium electrode which has a catalytic activity, additional catalysts or promoters may be incorporated into the porous intermediate layer, although of course not in the immediate vicinity of the mixed potential electrode. In this manner, a controlled influence may be had on the establishment of an equilibrium in the mixture, thus yielding the possibility of using other metal components that are not catalytically active for the equilibrium electrode. (Specification, page 5, lines 34 to page 6, line 10).

According to an exemplary embodiment of the present invention, with a total of only three electrodes, the oxygen concentration and the concentration of the reducing gas components may be determined simultaneously in certain operating states and thus the status of the lambda value may be determined directly. This may allow a more rapid and accurate establishment of the control status of the internal combustion engine. (Specification, page 6, lines 12 to 20).

Thus, the present invention is directed to a sensor for determining a concentration of gas components in a gas mixture, including: a first measuring electrode having substantially no catalytic effect on an establishment of an equilibrium in the gas mixture when exposed to the gas mixture, the first measuring electrode including a cermet electrode with at least one metal oxide component, the at least one metal oxide component being capable of reversible incorporation of oxygen, a second measuring electrode catalyzing an establishment of an equilibrium in the gas mixture when exposed to the gas mixture, and a solid electrolyte that is conductive for oxygen ions situated between the first and second measuring electrodes, the

cermet includes a metallic component and a ceramic component, the sensor is able to determine a concentration of an oxidizable component in the gas mixture. (See claim 10).

The present invention is further directed to the foregoing features, and the further feature in which the first measuring electrode is substantially composed of mixed oxides with a composition of one of $TiNiNbO_x$ and $FeNiMnO_4$. (See claim 11).

The present invention is further directed to the foregoing features, and the further feature in which the metal oxide component is at least one of CeO_2 and Mn_2O_3. (See claim 12).

The present invention is further directed to the foregoing features, and the further feature in which the first measuring electrode is a mixed potential electrode and further includes a metal component that is at least one of gold and silver. (See claim 13).

The present invention is further directed to the foregoing features, and the further feature in which the sensor includes a porous layer, the solid electrolyte being integrated into the porous layer. (See claims 14, 21, and 24).

The present invention is further directed to the foregoing features, and the further feature in which the porous layer contains at least one of promoters and catalysts at least in some areas. (See claim 15).

The present invention is further directed to the foregoing features, and the further feature in which the sensor includes a reference electrode exposed to a reference gas and at least one layer composed of an oxygen conducting solid electrolyte situated between the reference electrode and the measuring electrodes. (See claims 16, 26, and 27).

The present invention is further directed to the foregoing features, and the further feature in which the sensor includes a porous layer extending between the first and second measuring electrodes, one of the first and second measuring electrodes being situated on a side of the sensor facing the gas mixture, another of the measuring electrodes being situated between a reference electrode and the one of the measuring electrodes facing the gas mixture, the solid electrolyte being integrated into the porous layer. (See claims 17, 28, and 29).

The present invention is further directed to the foregoing features, and the further feature in which the one of the measuring electrodes facing the gas mixture is the first

measuring electrode. (See claim 18).

The present invention is further directed to the foregoing features, and the further feature in which a potential of lambda = 1 is applied when a lambda value of < 1 is present in the gas mixture, the potential is applied at the first measuring electrode. (See claim 19).

The present invention is further directed to the foregoing features, and the further feature in which the first measuring electrode is substantially composed of mixed oxides with a composition of one of $TiNiNbO_x$ and $FeNiMnO_4$. (See claim 20).

The present invention is further directed to the foregoing features, and the further feature in which the porous layer contains at least one of promoters and catalysts at least in some areas. (See claims 22 and 25).

The present invention is further directed to the foregoing features, and the further feature in which the metal oxide component is at least one of CeO_2 and Mn_2O_3, and the first measuring electrode is a mixed potential electrode and further includes a metal component that is at least one of gold and silver, in addition to the cermet. (See claim 23).

6. ISSUES

1. Under 35 U.S.C. § 112, first paragraph, do claims 10 to 29 lack enablement?

2. Under the first paragraph of 35 U.S.C. § 112, does the specification not support claims 20 to 22, 26 and 28 as to the written description requirement?

7. GROUPING OF CLAIMS

Issue 1

Group 1: Claims 10 to 29 stand or fall together.

Issue 2

Group 1: Claims 20 to 22, 26 and 28 stand or fall together.

8. ARGUMENT

Claims 10 to 29 are currently pending.

ISSUE 1- Group 1: Claims 10 to 29

With respect to paragraph two (2) of the Final Office Action, claims 10 to 29 were rejected under 35 U.S.C. § 112, first paragraph, as lacking enablement.

Claim 10 provides that the first measuring electrode includes a cermet electrode with at least one metal oxide component, the at least one metal oxide component being capable of reversible incorporation of oxygen, and further provides that the cermet includes a metallic component and a ceramic component. In support of this rejection, the Examiner contends that "the novelty of the invention resides at least in part on a new combination of metal oxide, ceramic, and metal, but applicant has neglected to specify (either generally or specifically) what the ceramic or metal would be." (See Final Office Action, page 3).

As described in the specification, "at least the first measuring electrode is a cermet electrode, where at least one metal oxide component of the cermet electrode is capable of reversible incorporation of oxygen, the potential of this first measuring electrode is kept almost constant in the range around lambda ≈ 1." (See Specification, page 4, lines 29 to 31). The specification states that "[s]uitable metal oxide components for the first measuring electrode include, for example, the mixed oxides such as $TiNiNbO_x$ or $FeNiMnO_4$"and that "a noble metal such as gold may also be incorporated into the first measuring electrode." (See Specification, page 5, lines 9 to 12). Furthermore, the specification states that "a mixed potential electrode 14 may be made mostly of $TiNiNbO_x$ or $FeNiMnO_4$", that "metal oxides such as Mn_2O_3 and CeO_2" may also be used, and that "the cermet electrode may also contain as an added metal component a noble metal such as gold or silver." (See Specification, page 8, lines 7 to 11).

Accordingly, it is respectfully submitted that the specification is enabling as to each of the claims, as would be understood by a person having ordinary skill in the art -- without undue experimentation.

Claim 11 to 29 depend from claim 10 and are therefore allowable for the same reasons

as claim 10.

As further regards claim 20, it provides that "the first measuring electrode is substantially composed of mixed oxides with a composition of one of $TiNiNbO_x$ and $FeNiMnO_4$". In particular, claim 20 depends from claim 12 which provides that "the metal oxide component is at least one of CeO_2 and Mn_2O_3." As specifically described in the specification, a "mixed potential electrode 14 may be made mostly of $TiNiNbO_x$ or $FeNiMnO_4$" and metal oxides such as Mn_2O_3 and CeO_2" may also be used (See Specification, page 8, lines 7 to 11), so claim 20 is enabled. It is therefore respectfully submitted that the disclosure is enabling.

Thus, claim 10 includes a first measuring electrode includes a cermet, which includes a metallic and a ceramic proportion, and a first measuring electrode that has a metal oxide. From this, the Office Action asserts that the electrode includes a metal, a ceramic and a metal oxide, and that these three components are different. It is, however, known to one skilled in the art that metal oxides are, as a rule, ceramic (for example, aluminum oxide). In particular, the metal oxides mentioned in the specification, $TiNiNbO_x$, $FeNiMnO_4$, Mn_2O_3 and CeO_2 are ceramic metal oxides, which form the ceramic proportion of the cermet. As to the first measuring electrode including a metallic proportion, in the present application, gold and silver are given as examples for the metallic proportion, so that gold or silver form the metallic proportion of the cermet electrode.

Accordingly, the claims are enabled for these reasons alone.

As further regards the enablement requirement under the first paragraph of 35 U.S.C. § 112, it is respectfully submitted that the standard for determining whether a patent application complies with the enablement requirement is that the specification describe how to make and use the invention -- which is defined by the claims. (See M.P.E.P. § 2164). The Supreme Court established the appropriate standard as being whether any experimentation for practicing the invention was undue or unreasonable. (See M.P.E.P. § 2164.01 (citing Mineral Separation v. Hyde, 242 U.S. 261, 270 (1916); In re Wands, 858 F.2d. 731, 737, 8 U.S.P.Q.2d 1400, 1404 (Fed Cir. 1988))). Thus, the enablement test is "whether one reasonably skilled in the art could make or use the invention from the disclosures in the

patent coupled with information known in the art without undue experimentation." (See id. (citing United States v. Teletronics, Inc., 857 F.2d 778, 785, 8 U.S.P.Q.2d 1217, 1223 (Fed. Cir. 1988))).

The Federal Circuit has made clear that there are many factors to be considered in determining whether a specification satisfies the enablement requirement, and that these factors include but are not limited to the following: the breadth of the claims; the nature of the invention; the state of the prior art; the level of ordinary skill; the level of predictability in the art; the amount of direction provided by the inventor; the existence of working examples; and the quantity of experimentation needed to make or use the invention based on the disclosure. (See id. (citing In re Wands, 858 F.2d at 737, 8 U.S.P.Q.2d at 1404 and 1407)). In this regard, the Federal Circuit has also stated that it is "improper to conclude that a disclosure is not enabling based on an analysis of only one of the above factors," and that the examiner's analysis must therefore "consider all the evidence related to each of these factors" so that any nonenablement conclusion "must be based on the evidence as a whole." (See M.P.E.P. § 2164.01). It is respectfully submitted that the Office Actions to date have not addressed these factors.

Importantly, an examiner bears the initial burden of establishing why the "scope of protection provided by a claim is not adequately enabled by the disclosure." (See id. (citing In re Wright, 999 F.2d 1557, 1562, 27 U.S.P.Q.2d 1510, 1513 (Fed. Cir. 1993))). Accordingly, a specification that teaches the manner and process of making and using an invention in terms that correspond in scope to those used in describing and defining the claimed subject matter complies with the enablement requirement. (See id.).

It is believed that the Office Actions to date do not meaningfully address -- as they must under the law -- whether the present application enables a person having ordinary skill in the art to practice the claimed subject matter of the claims without undue experimentation -- which it plainly does. In short, it is believed that the Office Actions to date do not really address the issue of whether one having ordinary skill would have to *unduly experiment* to practice the claimed subject matter of the rejected claims -- a proposition for which the Office bears the burden of proving a prima facie case as to the rejected claims.

In this regard, to properly establish enablement or non-enablement, the Office must make use of proper evidence, sound scientific reasoning and the established law. In the case of Ex Parte Reese, 40 U.S.P.Q.2d 1221 (Bd. Pat. App. & Int. 1996), a patent examiner rejected (under the first paragraph of section 112) application claims because they were based on an assertedly non-enabling disclosure, and was promptly reversed because the rejection was based only on the examiner's subjective belief that the specification was not enabling as to the claims. In particular, the subjective assertions of the Office Action are simply not supported by any real "evidence or sound scientific reasoning" -- which the law requires and which makes plain that the Office (and not an applicant) bears the burden of persuasion on an enablement rejection.

More particularly, the examiner in Ex parte Reese was reversed because the rejection had only been based on a conclusory statement that the specification did not contain a sufficiently explicit disclosure to enable a person to practice the claimed invention without exercising undue experimentation -- which the Board found to be merely a conclusory statement that only reflected the subjective and unsupported beliefs of a particular examiner and that was not supported by any proper evidence, facts or scientific reasoning. (See id.). Moreover, the Board made clear that it is "incumbent upon the Patent Office . . . to back up assertions of its own with acceptable evidence," and also made clear that "[where an] examiner's 'Response to Argument' is not supported by evidence, facts or sound scientific reasoning, [then an] examiner has not established a *prima facie* case of lack of enablement under 35 U.S.C. § 112, first paragraph." (See id. at 1222 & 1223; italics in original).

In the present case, it is respectfully submitted that the Office Actions to date have not satisfied the foregoing for establishing that undue experimentation would be required in view of the explanations provided herein, and it is therefore respectfully requested that the present rejections be withdrawn.

In view of at least the foregoing, it is respectfully submitted that claims 10 to 29 satisfy the enabling requirement of the first paragraph of 35 U.S.C. § 112.

ISSUE 2 - GROUP 1: Claims 20 to 22, 26 and 28

With respect to paragraph five (5), claims 20 to 22, 26 and 28 were rejected under the first paragraph of 35 U.S.C. § 112 as to the written description requirement.

Claims 20 to 22, 26 and 28 are allowable essentially for the reasons provided as to the enablement rejections as to claims 10 to 29. Still further, to the extent that the objections concern the written description requirement, the Office bears the initial burden of presenting "evidence or reasons why persons skilled in the art would not recognize in an applicant's disclosure a description of the invention defined by the claims." (See M.P.E.P. § 2163.04 (citing In re Wertheim 541 F.2d 257, 262, 265, 191 U.S.P.Q. 90, 96, 98 (C.C.P.A. 1976))) (emphasis added). It is therefore respectfully requested that the objection be withdrawn since the initial burden has not been addressed, especially in view of the explanations provided herein as to the enablement and written description requirements.

Accordingly, claims 10 to 29 are allowable.

CONCLUSION

In view of the above, it is respectfully requested that the rejections of claims 10 to 29 be reversed, and that these claims be allowed as presented.

Respectfully submitted,

Dated: 8/9/2004

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[10191/1417]

APPENDIX

1-9. (Canceled).

10. (Previously Presented) A sensor for determining a concentration of gas components in a gas mixture, comprising:

a first measuring electrode having substantially no catalytic effect on an establishment of an equilibrium in the gas mixture when exposed to the gas mixture, the first measuring electrode including a cermet electrode with at least one metal oxide component, the at least one metal oxide component being capable of reversible incorporation of oxygen;

a second measuring electrode catalyzing an establishment of an equilibrium in the gas mixture when exposed to the gas mixture; and

a solid electrolyte that is conductive for oxygen ions situated between the first and second measuring electrodes;

wherein the cermet includes a metallic component and a ceramic component, and

wherein the sensor is able to determine a concentration of an oxidizable component in the gas mixture.

11. (Previously Presented) The sensor according to claim 10, wherein the first measuring electrode is substantially composed of mixed oxides with a composition of one of $TiNiNbO_x$ and $FeNiMnO_4$.

12. (Previously Presented) The sensor according to claim 10, wherein the metal oxide component is at least one of CeO_2 and Mn_2O_3.

13. (Previously Presented) The sensor according to claim 10, wherein the first measuring electrode is a mixed potential electrode and further includes a metal component that is at least one of gold and silver.

14. (Previously Presented) The sensor according to claim 10, further comprising a porous layer, the solid electrolyte being integrated into the porous layer.

15. (Previously Presented) The sensor according to claim 14, wherein the porous layer contains at least one of promoters and catalysts at least in some areas.

16. (Previously Presented) The sensor according to claim 10, further comprising:

a reference electrode exposed to a reference gas; and

at least one layer composed of an oxygen conducting solid electrolyte situated between the reference electrode and the measuring electrodes.

17. (Previously Presented) The sensor according to claim 10, further comprising a porous layer extending between the first and second measuring electrodes, one of the first and second measuring electrodes being situated on a side of the sensor facing the gas mixture, another of the measuring electrodes being situated between a reference electrode and the one of the measuring electrodes facing the gas mixture, the solid electrolyte being integrated into the porous layer.

18. (Previously Presented) The sensor according to claim 17, wherein the one of the measuring electrodes facing the gas mixture is the first measuring electrode.

19. (Previously Presented) The sensor according to claim 10, wherein a potential of lambda = 1 is applied when a lambda value of < 1 is present in the gas mixture, the potential is applied at the first measuring electrode.

20. (Previously Presented) The sensor according to claim 12, wherein the first measuring electrode is substantially composed of mixed oxides with a composition of one of $TiNiNbO_x$ and $FeNiMnO_4$.

21. (Previously Presented) The sensor according to claim 20, further comprising a porous layer, the solid electrolyte being integrated into the porous layer.

22. (Previously Presented) The sensor according to claim 21, wherein the porous layer contains at least one of promoters and catalysts at least in some areas.

23. (Previously Presented) The sensor according to claim 10, wherein the metal oxide component is at least one of CeO_2 and Mn_2O_3, and the first measuring electrode is a mixed potential electrode and further includes a metal component that is at least one of gold and silver, in addition to the cermet.

24. (Previously Presented) The sensor according to claim 23, further comprising a porous layer, the solid electrolyte being integrated into the porous layer.

25. (Previously Presented) The sensor according to claim 24, wherein the porous layer contains at least one of promoters and catalysts at least in some areas.

26. (Previously Presented) The sensor according to claim 20, further comprising:

a reference electrode exposed to a reference gas; and

at least one layer composed of an oxygen conducting solid electrolyte situated between the reference electrode and the measuring electrodes.

27. (Previously Presented) The sensor according to claim 23, further comprising:

a reference electrode exposed to a reference gas; and

at least one layer composed of an oxygen conducting solid electrolyte situated between the reference electrode and the measuring electrodes.

28. (Previously Presented) The sensor according to claim 20, further comprising a porous layer extending between the first and second measuring electrodes, one of the first and second

measuring electrodes being situated on a side of the sensor facing the gas mixture, another of the measuring electrodes being situated between a reference electrode and the one of the measuring electrodes facing the gas mixture, the solid electrolyte being integrated into the porous layer.

29. (Previously Presented) The sensor according to claim 23, further comprising a porous layer extending between the first and second measuring electrodes, one of the first and second measuring electrodes being situated on a side of the sensor facing the gas mixture, another of the measuring electrodes being situated between a reference electrode and the one of the measuring electrodes facing the gas mixture, the solid electrolyte being integrated into the porous layer.